Claims

1. An isolated or purified polynucleotide selected from the group consisting of the polynucleotides of:

a) a polynucleotide comprising a nucleic acid sequence being at least 80 % identical to any one of sequences SEQ ID NO: 1-6 or fragments thereof having at least 15 consecutive nucleotides of sequences SEQ ID NO: 1-6.

b) a polynucleotide comprising the DNA sequence of SEQ ID NO: 1-6;

c) a polynucleotide encoding a polypeptide comprising the amino acid sequence of SEQ ID NO: 7-12.

d) a polynucleotide having at least 15 nucleotides that hybridizes to either strand of a denatured, double-stranded DNA having the nucleic acid sequence of SEQ ID NO: 1-6 under conditions of high stringency.

e) a polynucleotide of d), wherein said polynucleotide is derived by *in vitro* mutagenesis from SEQ ID NO: 1-6.

f) a polynucleotide degenerated from SEQ ID NO: 1-6 as a result of the genetic code.

g) a polynucleotide that is an allelic variant, or a homolog of the polynucleotide of a).

2. An isolated or purified polynucleotide of claim 1, wherein said polynucleotide is a bacterial artificial chromosome.

3. An isolated or purified polynucleotide of claim1, wherein said polynucleotide is a plasmid extracted from *Mycobacterium ulcerans* comprising about 174 kb with a GC content of 62.8% and carrying 81 CDS.

4. The isolated or purified polynucleotide of claim 1, wherein said polynucleotide encodes an enzyme required to produce mycolactone.

5. An isolated or purified polypeptide encoded by a polynucleotide of claims 1.

6. The isolated or purified polypeptide of claim 5, wherein it has an amino acid sequence being at least 80% identical to any one of sequences SEQ ID NO: 7-12.

7. The isolated or purified polypeptide of claims 5 or 6, wherein it comprises an amino acid sequence SEQ ID NO: 7-12.

8. The isolated or purified polypeptide of claim 6, wherein said polypeptide is required to produce mycolactone.

9. The isolated or purified polypeptide according to claims 5 to 8 in non-glycosylated form.

10. A recombinant vector that directs the expression of a polynucleotide of claims 1 to 4.

11. A host cell transfected or transduced with the vector of claim 10.

12. A transformed or transfected cell containing the polynucleotide as defined in any of claims1 to 4.

13. A cell according to claims 11 or 12, wherein the host cell is selected from the group consisting of bacterial cells, yeast cells, plant cells, and animal cells.

14. The cell of claim 13, wherein said cell consists of a *Escherichia coli* bacterium.

15. The cell of claim 14, wherein the *Escherichia coli* bacterium is the cell deposited at the Collection Nationale de Cultures de Microorganismes (C.N.C.M.), of Institut Pasteur (France) on November 3, 2003, under accession number CNCM I-3121 or CNCM I-3122.

16. A method for the production of polypeptides comprising culturing the host cell of claims 11 to 15 under conditions promoting expression, and recovering polypeptides from the culture medium.

17. An antibody that specifically binds to the polypeptide of claims 5 to 9.

18. The antibody according to claim 17, wherein said antibody is a monoclonal antibody.

19. An immunological complex comprising a MLS polypeptide of MU and an antibody that specifically recognizes said polypeptide.

20. A method for detecting infection by MU, wherein the method comprises providing a composition comprising a biological material suspected of being infected with MU, and assaying for the presence of an MLS polypeptide of MU.

21. The method of claim 20, wherein the MLS polypeptide is assayed by electrophoresis or by immunoassay with antibodies that are immunologically reactive with the MLS polypeptide.

22. An *in vitro* diagnostic method for the detection of the presence or absence of antibodies, which bind to an antigen comprising a MLS polypeptide, wherein the method comprises contacting the antigen with a biological material for a time and under conditions sufficient for the antigen and antibodies in the biological material to form an antigen-antibody complex, and detecting the formation of the complex.

23. The method of claim 22, which further comprises measuring the formation of the antigen-antibody complex.

24. The method of claim 22, wherein the formation of antigen-antibody complex is detected by immunoassay based on Western blot technique, ELISA, indirect immuno-fluorescence assay, or immunoprecipitation assay.

25. A diagnostic kit for the detection of the presence or absence of antibodies, which bind to MLS polypeptide or mixtures thereof, wherein the kit comprises an antigen comprising MLS polypeptide or mixtures of MLS polypeptides, and means for detecting the formation of immune complex between the antigen and antibodies, wherein the means are present in an amount sufficient to perform said detection.

26. An immunogenic composition comprising at least one MLS polypeptide in an amount sufficient to induce an immunogenic or protective response *in vivo*, and a pharmaceutically acceptable carrier therefor.

27. The immunogenic composition of claim 26, wherein said composition comprises a neutralizing amount of at least one MLS polypeptide.

28. A method for detecting the presence or absence of MU comprising:

(1) contacting a sample suspected of containing genetic material of MU with at least one nucleotide probe, and

(2) detecting hybridization between the nucleotide probe and the genetic material in the sample,

wherein said nucleotide probe is a polynucleotide of claim 1d).

29. A process to produce variants of mycolactone comprising the following steps:

a) mutagenesis of the isolated or purified polynucleotide of claim 1a),

b) expression of the said mutated polynucleotide in a *Mycobacterium* strain,

c) selection of *Mycobacterium* mutants altered in the production of mycolactone by DNA sequencing of and mass spectrometry,

d) culture of the selected transfected *Mycobacterium*, and

e) extraction of mycolactone variants from the culture of said culture.

30. The process of claim 29 wherein the isolated or purified polynucleotide has a nucleic acid sequence being at least 80% identical to the sequence SEQ ID NO:4 or fragments thereof.

31. A process to produce mycolactone in a fast-growing mycobacterium comprising the following steps:

a) cloning at least the three isolated polynucleotides comprising the DNA sequences of SEQ ID NO:1, 2 and 3 or three isolated polynucleotides that hybridize to either strand of denatured, double-stranded DNAs comprising the nucleotide sequences SEQ ID NO:1, 2 and 3 in a fast-growing mycobacterium,

b) expressing the isolated polynucleotides by growing the recombinant mycobacterium in appropiate culture conditions, and

c) purifying the produced mycolactone.

32. The process of claim 31 wherein the isolated polynucleotides comprise the DNA sequences of SEQ ID NO:1 to 6 or isolated polynucleotides having at least 15 nucleotides that hybridize to either strand of denatured, double-stranded DNAs comprising the nucleotide sequences SEQ ID NO:1 to 6.